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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/611,955 07/06/00 UZOH

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MM91/0719  
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EXAMINER

VU, H

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 07/19/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

# Office Action Summary

Application No.

09/611,955

Applicant(s)

UZOH ET AL.

Examiner

Hung K. Vu

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 7/6/00.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 25-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 25-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the semiconductor substrate, as recited in claim 25, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 30 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification does not disclose the copper seed layer is about 4000 to about 20,000 angstrom thick.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 25-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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In claim 25, lines 2-5, the phrase “recesses located in at least one major surface of said semiconductor substrate; electrical insulating layer over the at least one major surface and in said recesses” is unclear as to whether it is being referred to a substrate that has an electrical insulating layer forming over the substrate, wherein the insulating layer has recesses.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 25-26 and 28-31 are rejected under 35 U.S.C. 102(e) as being anticipated by

Ashley et al. (PN 6,130,161).

Ashley et al. discloses a semiconductor structure comprising a semiconductor substrate having a major surface; an electrical insulating layer (3) forming over the substrate, wherein the insulating layer having recesses; a conductive barrier (5,6) over the insulating layer; a seed layer (8) located over the conductive barrier within recesses only; and a conductive metal (9) in recesses. Note Figures 2-6(d) of Ashley et al..

With regard to claim 26, Ashley et al. discloses wherein the barrier comprises a layer of tantalum nitride (5) adjacent the insulating layer and a layer of tantalum (6) above the tantalum nitride layer.

With regard to claim 28, Ashley et al. discloses wherein the seed layer is copper.

With regard to claims 25, 29, and 31, the terms “plating”, “electroplated”, and “sputtered” are method recitations in a device claimed, and they are non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

With regard to claim 30, Ashley et al. discloses wherein the copper is about 600 to 2000 angstroms thick.

With regard to claim 31, Ashley et al. discloses wherein the conductive metal is copper.

5. Claims 25-26, 28-29, and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen et al. (PN 6,207,222).

Chen et al. discloses a semiconductor structure comprising a semiconductor substrate having a major surface; an electrical insulating layer (42) forming over the substrate, wherein the insulating layer having recesses; a conductive barrier (54) over the insulating layer; a seed layer (55) located over the conductive barrier within recesses only; and a conductive metal (62) in recesses. Note Figures 1A-4E of Chen et al..

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With regard to claim 26, Chen et al. discloses wherein the barrier comprises a layer of tantalum nitride adjacent the insulating layer and a layer of tantalum above the tantalum nitride layer.

With regard to claim 28, Ashley et al. discloses wherein the seed layer is copper.

With regard to claims 25, 29, and 31, the terms “plating”, “electroplated”, and “sputtered” are method recitations in a device claimed, and they are non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

With regard to claim 31, Ashley et al. discloses wherein the conductive metal is copper.

6. Claims 25, 28, 29, and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by Jain (PN 5,821,168, of record).

Jain discloses a semiconductor structure comprising a semiconductor substrate (12) having a major surface; an electrical insulating layer (54) forming over the substrate, wherein the insulating layer having recesses; a conductive barrier (not shown) over the insulating layer; a seed layer (60) located over the conductive barrier within recesses only; and a conductive metal (74) in recesses.

With regard to claim 28, Jain discloses wherein the seed layer is copper.

With regard to claims 25, 29, and 31, the terms "plating", "electroplated", and "sputtered" are method recitations in a device claimed, and they are non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

With regard to claim 31, Jain discloses wherein the conductive metal is copper.

### *Claim Rejections - 35 USC § 103*

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ashley et al. (PN 6,130,161).

Ashley et al. discloses wherein the tantalum nitride layer is about 100 to about 300 angstroms thick (within the range of about 15 to about 500 angstroms) and the tantalum layer is about 200 to 400 angstroms thick. Although Ashley et al. does not teach the exact the thickness of

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tantalum layer, as that claimed by Applicants, the thickness differences are considered obvious design choices and are not patentable unless unobvious or unexpected results are obtained from these changes. It appears that these changes produce no functional differences and therefore would have been obvious. Note *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Circ. 1990).

8. Claims 27 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (PN 6,207,222)

Chen et al. discloses all of the claimed limitations except the thickness of the barrier and the copper. Although Chen et al. does not teach the exact the thickness of barrier and the copper, as that claimed by Applicants, the thickness differences are considered obvious design choices and are not patentable unless unobvious or unexpected results are obtained from these changes. It appears that these changes produce no functional differences and therefore would have been obvious. Note *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Circ. 1990).

### ***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 7:00-5:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the



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organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

July 13, 2001

Steven Loke  
Primary Examiner

A handwritten signature in cursive script that reads "Steven Loke".